A PLC Based Power Factor Controller For A 3-Phase Induction Motor

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Summary

This paper proposes a power factor controller (PFC) for a three-phase induction motor (IM), utilizing the programmable logic controller (PLC). This work focuses on the implementation of a laboratory model for a PLC based PFC to improve the power factor of a three-phase induction motor. In addition to keep its voltage to frequency ratio constant in order to maintain a maximum torque over the whole control conditions. During the online process a set of capacitors sized in a binary ratio will be switched on or off with the help of zero voltage static switches according to a control strategy to obtain a pre-specified power factor. This control strategy relies on a look-up table and an expert system. The look-up table is prepared according to a measured value of the phase angle between the stator phase voltage and the stator phase current. Implementation of a software algorithm incorporates measuring the power factor angle, selecting the binary pattern according to the control strategy and sending command signals to switch the appropriate capacitors and protection switches. Zero voltage switching of static switches is also allocated in the control algorithm to prevent the occurrence of the transients, pseudo oscillation and harmonics. Experimental studies have been carried-out for verifying the operation performance of the proposed PFC under different operating conditions. Details of the experimental setup and test results in addition to the recommendations are also demonstrated

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